Here we report an unusual case of a large pseudoaneurysm of the superior mesenteric artery, in which the pathogenesis was related to recurrent pancreatitis. The pseudoaneurysm spontaneously thrombosed without any surgery or endovascular embolization. To our knowledge, spontaneous thrombosis of superior mesenteric artery pseudoaneurysms is extremely rare. The ultrasound and multidetector CT images of the pseudoaneurysm are presented. In this report, we discuss the causality and pathophysiology of this self-cured thrombosed pseudoaneurysm.

CASE REPORT

A 28-year-old man with a history of acute pancreatitis since last December and a 10 year history of alcohol abuse was referred to us because of dizziness, hematemesis and tarry stool. At admission, clinical investigation showed pale conjunctiva. Hematology showed mild microcytic anemia (erythrocyte count = 4.8 x 106 μ/L, hemoglobin = 10.9 g/dL, hematocrit = 34.1%, mean corpuscle volume = 71.0 fL). Biochemical tests demonstrated elevation of pancreatic enzymes (amylase = 132 U/L, lipase = 190 U/L).

Computed tomography (CT) showed swelling of the pancreatic head and minimal fluid over the peripancreatic space. Mild dilatation of the pancreatic duct and several pseudocysts over the head, uncinate process, body and tail of the pancreas were also found. In addition, an enhancing lesion about 0.7 x 0.4 cm in size over the pancreatic uncinate process region was identified on arterial phase images. Pseudoaneurysm secondary to acute pancreatitis was suspected. Upper gastrointestinal panendoscopy was performed for the hematemesis and tarry stool, which revealed a 1.5 cm A2 ulcer with bleeding over the duodenum. Consequently, injection with 1 mg of a hematostatic agent (epinephrine) to the
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bleeding site was performed under endoscopy. The ulcer bleeding stopped and the recurrent pancreatitis subsided gradually.

Five weeks after discharge, a follow-up abdominal ultrasound at the outpatient department (OPD) showed a large pseudoaneurysm about 2.8 cm in diameter with the yin-yang sign [4] adjacent to the pancreatic head (Fig. 1). The second CT examination demonstrated that the prior pseudoaneurysm had become much larger (about 6.9 x 4.6 x 5.0 cm in size) with mural thrombus formation, and the lumen size measured about 4.0 x 4.0 x 2.8 cm (Fig. 2a). On multi-planar imaging reconstruction (MPR), the filiform orifice between the superior mesenteric artery and the pseudoaneurysm could be identified (Fig. 2b). The diagnosis of a superior mesenteric artery pseudoaneurysm was established. Angiography with transarterial embolization was suggested, but the patient refused the intervention procedure because he felt well.

The patient was asked to follow up at our OPD every 3 to 6 months. The following contrast-enhanced abdominal CT was performed six months after discharge. Much to our surprise, the pseudoaneurysm resolved completely with a residual, small, calcified nodule at the pancreatic uncinate process region, which may have been a calcified granuloma after resolution of the pseudoaneurysm (Fig. 3).

DISCUSSION

Pseudoaneurysm of the superior mesenteric artery has been reported in association with pancreatitis, operations, or blunt abdominal trauma. In patients with acute or chronic pancreatitis, the

![Figure 1. Abdominal Doppler sonography showed a large pseudoaneurysm (arrow) about 2.8 cm in diameter with the yin-yang sign adjacent to the pancreatic head.](image1)

![Figure 2a. The following contrast-enhanced abdominal CT revealed a much larger pseudoaneurysm (arrow) (about 6.9 x 4.6 x 5.0 cm in size) with mural thrombus formation, the lumen size was measured about 4.0 x 4.0 x 2.8 cm.](image2a)

![Figure 2b. The multi-planar reformation (MPR) image demonstrated a filiform orifice (arrow) between superior mesenteric artery and the pseudoaneurysm.](image2b)
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Enzymatic digestion of the vascular wall causes the pseudoaneurysm [5]. It occurs more often in chronic pancreatitis, and most commonly in the splenic artery due to its proximity to the pancreas. The incidence is progressively smaller for the gastroduodenal artery, the small pancreatic arteries and other surrounding arteries [6]. Rupture with bleeding is the main risk of a visceral pseudoaneurysm which is associated with a high mortality rate [7]. Fortunately, the large pseudoaneurysm in this patient thrombosed spontaneously instead of rupturing. To our knowledge, this unusual condition of a spontaneous thrombosis of a superior mesenteric artery pseudoaneurysm secondary to pancreatitis is very rare. The causality and pathophysiology of this spontaneously thrombosed pseudoaneurysm is of interest.

Spontaneous regression of small visceral pseudoaneurysms have been reported. It is thought that asymptomatic visceral pseudoaneurysms smaller than 2.5 cm can regress spontaneously [8]. Conservative treatment for this condition is recommended, except for women of child bearing age. However, the pseudoaneurysm was larger than 5 cm in our case. Factors that increase coagulability and decrease blood flow such as dehydration, hypotension, vasospasm, local damage to the arterial wall, and occult malignancy can cause spontaneous thrombosis of a pseudoaneurysm [9]. However, none of these factors were found in our patient during the period.

The neck of the pseudoaneurysm in our patient was very narrow, about 1 mm in diameter. Some animal studies show that the ratio of the size of the pseudoaneurysm to the size of the orifice seems to affect thrombosis. In an animal study by Black et al., they concluded that the ratio of body size (in cubic millimeters) to orifice area (in square millimeters) larger than 28:1 precipitates thrombosis [10]. In our patient, the ratio was more than 500:1. In another experimental animal study by Roach, the authors found that when the height or length of the intracranial pseudoaneurysm was more than four times the diameter of the orifice, it thrombosed; when it was 2-2.5 times the diameter, it ruptured [11]. The length of the pseudoaneurysm was more than 28 times the diameter of the filiform orifice in our patient. These theories may explain the spontaneous thrombosis of the pseudoaneurysm in our patient.

In an analytic study of blood flow in intracranial aneurysms, Gonzalez et al. demonstrated that flow in large aneurysms is complicated by blood stagnation, increased blood viscosity, and slow flow, which may cause aneurysm thrombosis [12]. Aneurysms with a small orifice led to lower flow velocities, diverging blood flow direction, and smaller shearing forces than those with a large orifice [12]. The pseudoaneurysm in our patient was large (6.9 x 4.6 x 5.0 cm) and the orifice was very narrow (1 mm), both of which could cause the blood flow properties predisposing to thrombosis.

In conclusion, a pseudoaneurysm with filiform orifice which spontaneously thrombosed was reported. Its blood flow properties may be the main cause of spontaneous thrombosis. Although the pathophysiology of spontaneous thrombosis in a pseudoaneurysm has been understood gradually, visceral artery pseudoaneurysm should still be treated with transcatheter arterial embolization or surgical ligation if possible, because there is no definitive clinical evidence for predicting its outcome.

REFERENCES

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一自發栓塞的上腸繫膜動脈大假性動脈瘤：
一罕見病例報告

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我們報告一個罕見病例，這是一個上腸繫膜動脈的大假性動脈瘤，它的形成和復發性胰臟炎有關，但它不經手術治療或血管栓塞就自發性栓塞癒合了。就現有的知識中，上腸繫膜動脈的大假性動脈瘤會自發性栓塞是很罕見的。我們展示這個假性動脈瘤在多切面電腦斷層和超音波的影像。並且在這個報告中，我們討論了這個假性動脈瘤會自發栓塞的成因及病生理機轉。